K25 Comparison of the Intercept® and Salivette® Oral Fluid Specimen Collection Devices for the Detection of Marijuana Use

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The goal of this presentation is to inform forensic toxicologists concerning the analytical efficiency of two oral fluid collection devices for detection of marijuana constituents and their utility for detection of marijuana use as compared to urine specimens.

This presentation will impact the forensic community and/or humanity by improving understanding of oral fluid testing and detection of marijuana use.

A comparison of the analytical efficiency of two different oral fluid collection devices and immunoassay systems for detection of marijuana constituents; and the detection of marijuana use by these oral fluid methods as compared to urine drug testing will be presented. Oral fluid specimens were collected by both the Intercept (OraSure Technologies, Inc.) and the Salivette (Sarstedt) collection devices and a urine specimen was obtained from 519 suspected marijuana users. The oral fluid specimens collected by the Intercept device were initially analyzed by the Cannabinoids Intercept Micro-Plate Elisa Immunoassay (OraSure) in a Personal Lab (Trinity Biotech) at a cut-off tetrahydrocannabinol (THC) concentration of 1 ng/mL. The oral fluid specimens collected by the Salivette device were initially analyzed by the Oral Fluid Cannabinoid Enzyme Immunoassay (LinZhi International, Inc.) in a Hitachi 717 modified for sample volume of 60 uL at a cut-off THC concentration of 5 ng/mL. Urine specimens were initially analyzed by the Emit II Plus Cannabinoid Enzyme Immunoassay (Syva Co.) in a Hitachi 717 at a cut-off tetrahydrocannabinolic acid (THCA) concentration of 50 ng/mL. Any positive initial test was confirmed by GC/MS. THC was isolated from oral fluid by liquid/liquid extraction and derivatized with MSTFA. TMS-THC was identified by monitoring 386, 303, 387 m/z ions. The LOQ of the method was 0.2 ng/mL. . THCA was isolated from urine by liquid/liquid extraction and derivatized with MSTFA. TMS-THCA was identified by monitoring 371, 473, 488 m/z ions. The LOQ of the method was 3.0 ng/mL. Approximately, 10% (51/519) of at least one of the specimens from the donors was positive for THC or THCA by GC/MS analysis; THC was detected in 32 oral fluid and THCA in 51 urine specimens. There was complete concordance between positive THC findings by both immunoassays and GC/MS for only 23 of the 32 oral fluids specimens. However, there was a 97% concordance between negative THC findings by both immunoassays and GC/MS for 477 of the 491 oral fluids specimens. Comparing results from the Intercept method with GC/MS, the analytical sensitivity of the Intercept/Elisa method was 94% and the analytical selectivity was 99.4%. Comparing results from the Salivette method with GC/MS, the analytical sensitivity of the Salivette/Enzyme immunoassay method was 78% and the analytical selectivity was 99.8%. The difference in sensitivity between these methods was due to the difference between the cut-off values; Elisa, 1 ng/mL and enzyme immunoassay, 5 ng/mL. The Salivette/Enzyme immunoassay method yielded 7 false negative results. The Intercept/Elisa method was less selective than the Salivette/Enzyme immunoassay as it yielded 3 false positive results. Urine testing resulted in a significant increase in positive cannabinoid findings as compared to oral fluid testing. While oral fluid testing yielded only 32 positive findings, 51 urine specimens tested positive by initial screening and GC/MS. This represents a 68% increase in the detection of marijuana use. This increase was due to the prolonged excretion of THCA in urine as compared to the presence of THC in oral fluid. The presented data demonstrates the need for very low THC cut-off concentrations (1 ng/mL) when screening oral fluids for consistent detection of cannabinoids. Additionally, marijuana use is best detected by urine drug testing, even at a THCA cut-off value of 50 ng/mL, as compared to oral fluid testing at 1 ng/mL.

Oral Fluids Testing, Urine Drug Testing, Cannabinoids

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